Name: Date:

Exam: Function Reflections (Solution version 623)

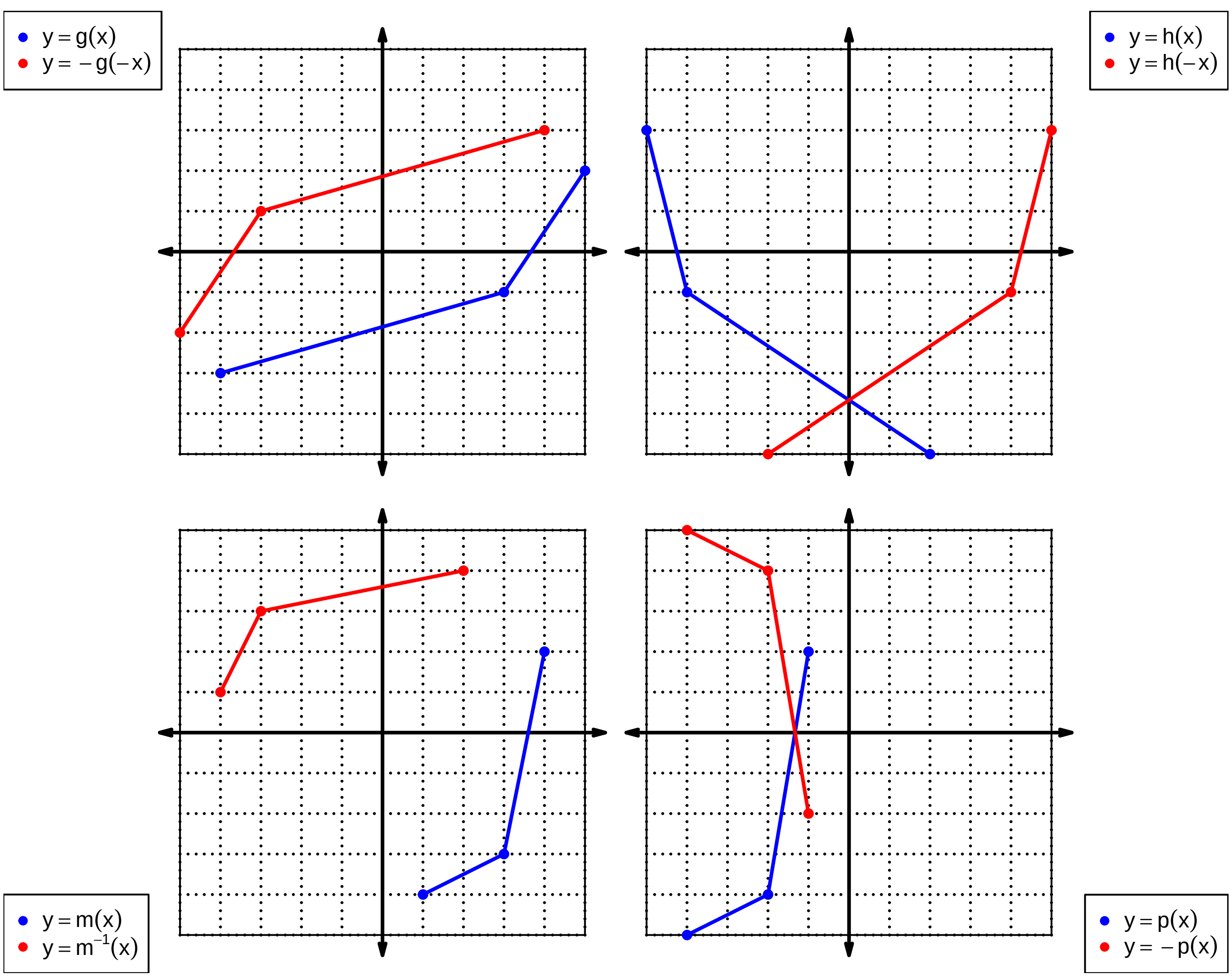
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) \;=\; 7x^4 + 8x^3 - 5x^2 - 6x - 2$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials
$f(-x)$	$-7x^4+8x^3+5x^2-6x+2$
$-f(x)$	$-7x^4-8x^3+5x^2+6x+2$
$-f(-x)$	$7x^4-8x^3-5x^2+6x-2$

2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	8	5	9
2	4	1	5
3	9	9	6
4	1	6	8
5	6	4	7
6	7	2	4
7	3	8	1
8	5	3	2
9	2	7	3

3. (worth 3 points) Evaluate $h(1)$.

$$h(1) = 9$$

4. (worth 3 points) Evaluate $f^{-1}(5)$.

$$f^{-1}(5) = 8$$

5. (worth 3 points) Assuming g is an **odd** function, evaluate $g(-3)$.

If function g is odd, then

$$g(-3) = -9$$

6. (worth 3 points) Assuming h is an **even** function, evaluate $h(-7)$.

If function h is even, then

$$h(-7) = 1$$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
Let polynomial p be defined with the following equation:

$$p(x) = -x^2 + 1$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^2 + 1$$
$$p(-x) = -x^2 + 1$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(-x^2 + 1\right)$$
$$-p(-x) = x^2 - 1$$

c. Is polynomial p even, odd, or neither?

even

d. Explain how you know the answer to part c.

We see that $p(x) = p(-x)$ for all x because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an even function.

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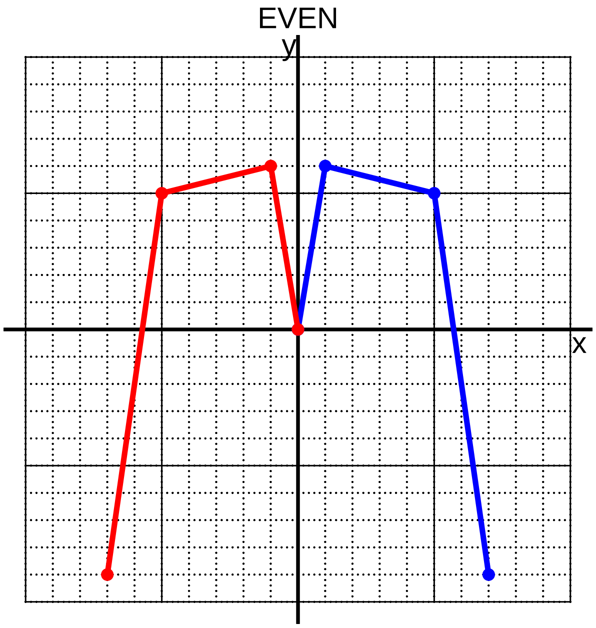
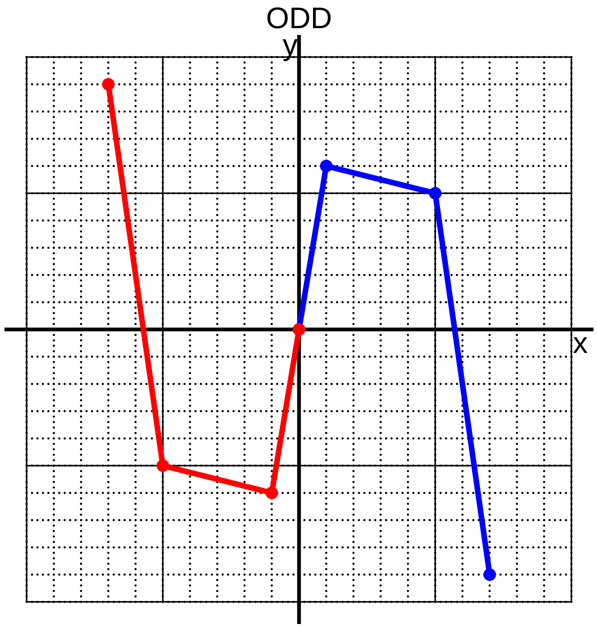
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.





9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = \frac{x-3}{7}$$

a. Evaluate $f(17)$.

step 1: subtract 3
step 2: divide by 7

$$f(17) = \frac{(17)-3}{7}$$
$$f(17) = 2$$

b. Evaluate $f^{-1}(13)$.

step 1: multiply by 7
step 2: add 3

$$f^{-1}(x) = 7x+3$$
$$f^{-1}(13) = 7(13)+3$$
$$f^{-1}(13) = 94$$

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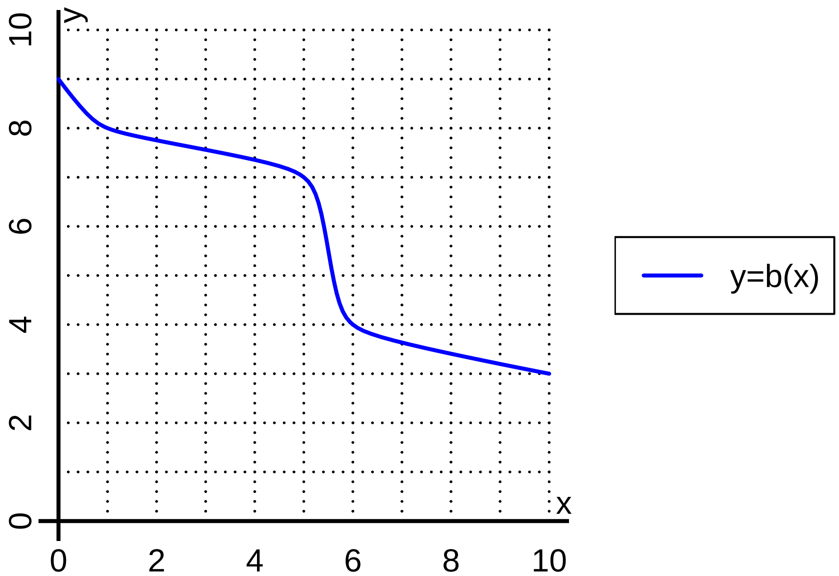
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(6)$.

$$b(6) \;=\; 4$$

b. Evaluate $b^{-1}(7)$.

$$b^{-1}(7) \;=\; 5$$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-6	6	-6	6
-1	-3	3	3	-3
0	0	0	0	0
1	3	-3	-3	3
2	-6	6	-6	6

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.